FY 2000 Program

U.S. Army
Research Institute
for the Behavioral and Social Sciences

October 1999

ARI PROGRAM 2000

Dr. Edgar M. Johnson
Director

The Year 2000 will mark not only the beginning of a new millennium, but also 60 years of service of the Army Research Institute to the United States Army. From its beginnings, with a focus on personnel selection in World War II, ARI has evolved by covering a wide range of R&D concerns, including human factors, training, social issues, manpower planning, and leadership.

Dr. Zita Simutis
Technical Director

Our FY2000 program responds to the demand for new and innovative approaches to Army training, leader development, and soldier quality. Our training research will focus on how best to prepare the Army of the future as it faces a variety of missions, with changing equipment, doctrine, and organizational structures, and as new technological advances become available to support training innovations. Training for the digitized environment will be emphasized, as will the development of next-generation, simulation-based training technologies. Our leader development research will provide new strategies to prepare Army leaders at all levels to effectively plan and perform a range of missions under rapidly changing conditions and with a diverse mix of soldiers, units, and equipment. Our programs that support the soldier will provide tools to attract, select and promote high quality people with the aptitudes needed for 21st century Army jobs, optimize the person-job match, and improve retention of quality soldiers committed to the Army.

The FY2000 program continues ARI's broad-based approach to personnel performance and training by ensuring that Army programs benefit from state-of-the-art behavioral and social science knowledge and techniques. As the Army enters the new millennium with the challenges facing Force XXI and Army 2010 and Beyond, ARI will continue to be at the scientific forefront providing the research and studies to help the Army *be all it can be.*

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Introduction

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is the Army's lead laboratory conducting research, development, and analysis on training, leader development and soldier (TLS) issues. ARI's focus is on the human element in the Army, with research and analysis contributing to the entire soldier life cycle of recruiting, selection, assignment, training, and mission performance. ARI:

- provides new technology to meet the TLS challenges of the Army;
- conducts studies and analyses to address short-term issues and respond to emerging "hot topics"; and
- provides technical assistance on critical issues affecting all parts of the Army – the organization, the people, and the technologies for the future.

ARI's program supports three of the Army's Imperatives: Quality People, Leader Development, and Training.
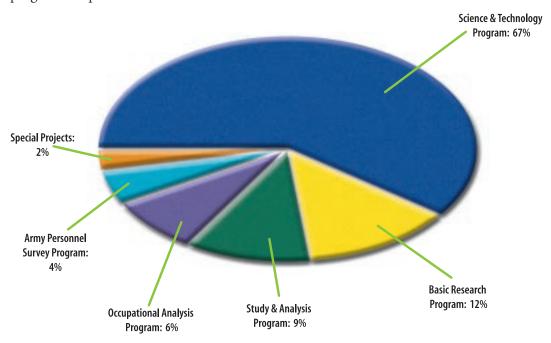
ARI Program Components

ARI's approved *training, leader development, and soldier* program consists of:

- **Science and Technology (S&T) Program:** Research and Development efforts addressing mid-term (3-6 year) Army needs.
- **Study and Analysis Program:** Short-term projects responsive to annual requests for information on specific personnel and training issues.
- **Special Projects:** One-time efforts performed in response to "hot topics" identified by senior Army leaders.
- **Basic Research Program:** Basic research dealing with scientific questions of interest to the Army.
- **Occupational Analysis Program:** Application of known principles and analytical techniques to the improvement of Army job structures.
- **Army Personnel Survey Program:** Application of data collection technology to the measurement of attitudes and opinions.

FY2000 Budget Allocation

The chart below shows the percentages of the total FY 2000 ARI budget devoted to each of its program components.

Science & Technology Program: 67%

Special Projects: 2%

Army Personnel Survey Program: 4%

Occupational Analysis Program: 6%

Study & Analysis Program: 9%

Basic Research Program: 12%

Organizational Structure

The map below shows ARI's locations in Alexandria, Virgina and at Army installations. Programs are executed through eleven Research Units and Offices. The Research and Advanced Concepts Office (RACO) manages our Basic Research Program that focuses on issues of the future, prim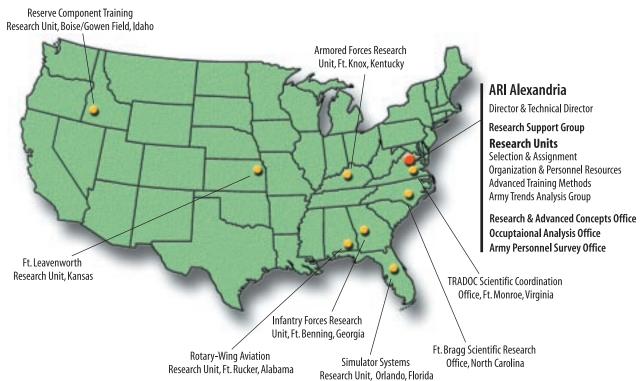arily through university-based efforts. In addition, ARI has two offices that provide operational support and one that provides coordination and liaison. Operational support is provided by: (1) the Army Personnel Survey Office (APSO) that develops and fields Army-wide surveys and provides expertise on personnel survey development and methodology to other Army and DoD agencies; and (2) the Occupational Analysis Office (OAO) that develops analytical tools and methods and conducts complex Army-wide occupational/job surveys and analyses. Coordination and liaison with TRADOC is provided by a Scientific Coordination Office located at its headquarters.

Organizational Structure
U.S. Army Research Institute
for the Behavioral & Social Sciences

Reserve Component Training
Research Unit, Boise/Gowen Field, Idaho

Armored Forces Research
Unit, Ft. Knox, Kentucky

ARI Alexandria
Director & Technical Director

Research Support Group
Research Units
Selection & Assignment
Organization & Personnel Resources
Advanced Training Methods
Army Trends Analysis Group

Research & Advanced Concepts Office
Occuptaional Analysis Office
Army Personnel Survey Office

Ft. Leavenworth
Research Unit, Kansas

TRADOC Scientific Coordination
Office, Ft. Monroe, Virginia

Infantry Forces Research
Unit, Ft. Benning, Georgia

Rotary-Wing Aviation
Research Unit, Ft. Rucker, Alabama

Simulator Systems
Research Unit, Orlando, Florida

Ft. Bragg Scientific Research
Office, North Carolina

SCIENCE & TECHNOLOGY PROGRAM

Training

ARI's Training S&T Program includes twelve work packages that address next-generation simulation-based training systems and new training methods that will be needed to prepare soldiers and units to win on future battlefields.

Leader Development

Our Leader Development program focuses on methods to improve the critical thinking skills and the adaptability needed by future leaders.

Soldier

ARI's Soldier S&T Program includes four work packages that develop technologies to maintain and enhance the quality of the Army.

Land Warrior Training

The Land Warrior (LW) Soldier System can enhance the warfighting capability of dismounted forces to meet Army Vision 2010 requirements. It will impact the fundamentals of shooting, moving, and communicating, and give most soldiers the battlefield information capabilities typically reserved for leaders. As a result, it will have a far-reaching impact on the institutional and unit training needed to ensure that both soldiers and leaders can exploit the LW system's improved warfighting capabilities.

Infantry Fighting System

This effort (FY1999-00) has provided the Army with an assessment of the training requirements for the target acquisition systems (day/night optics and sensors) and weapons embedded in LW. We have also determined the expected performance (lethality) of these systems with the "soldier-in-the loop." Assessments were also made of the impact of the LW system on institutional training for officer and enlisted personnel.

The level of computer experience and skills for the typical Infantry soldier and leader will be examined each year as a basis for investigating the effectiveness of alternative training programs. Training experiments will use materials tailored to individual needs that train computer skills ranging from basic to specific LW requirements. We will deliver results of this research to the Infantry School, TRADOC Systems Manager-Soldier, and Project Manager-LW for their use in determining the resource requirements for the LW system and in designing LW training device software.

Dr. Scott E. Graham
Chief, Infantry Forces
Research Unit

In FY2000 we will:

• Develop and assess computer-based alternatives for training basic computer skills by varying the degree of soldier interactivity and information load

• Determine the extent to which training on a selected set of LW message formats and graphical techniques transfers to other LW messages and graphics

Virtual Environment Research for Infantry Training & Simulation

Members of small dismounted infantry units will face growing responsibilities and increasing challenges in combined arms combat and in contingency operations on the digitized battlefield of Army , 2010 and Beyond. Training for night operations, Military Operations in Urban Terrain (MOUT), and other diverse missions are limited by time, cost, and safety factors. Virtual Environment (VE) technologies have the potential to provide the Army with a training capability to meet these new demands.

This effort (FY1999-02) will provide the Army with:

- Prototype, VE-based, dismounted-soldier simulation system with instructional features that enhance the effectiveness of training and mission rehearsal.
- Effective training methods, strategies and procedures for using VE technology to train and prepare dismounted small unit leaders to conduct night, MOUT, and contingency operations.

Dismounted Soldier Simulation

Results from experimental evaluations at the Dismounted Battlespace Battle Lab (DBBL) will facilitate the development of requirements for dismounted training simulators and future infantry simulations. This work will be carried out in conjunction with the U.S. Army Simulation, Training, and Instrumentation Command,and will have immediate application to their simulation products. We have developed and evaluated initial VE-based small unit leader training vignettes and implemented an immersive testbed for small unit training.

In FY2000 we will:

- Implement and evaluate instructional feature and training strategy enhancements to the MOUT/contingency operations trainer.
- Evaluate training potential of emerging Infantry simulation technologies in the Squad Synthetic Environment at the DBBL.
- Define and validate VE technologies for the realistic portrayal of conditions in the Squad Synthetic Environment to support Army, 2010 and Beyond scenarios.

Dr. Stephen L. Goldberg
Chief, Simulator
Systems Research Unit

Simulation-Based Aviator Training

Army flight training is evolving toward greater reliance upon simulators as downsizing and reduced resources provide fewer aircraft hours and instructors. These factors, along with the accelerating pace of simulation technology, have prompted the Army to exploit the training potential of simulation as the primary means of skill learning to attain basic and advanced aircraft qualification.

Flight Qualification with Simulation

This effort (FY1999-03) will provide the Army with training objectives, methods, and instructional strategies that illustrate how simulation can best support Army flight training, from initial to advanced aircraft qualification. In cooperation with the Army Aviation Center, we have begun developing prototype-training programs that use simulators together with aircraft in combinations intended to exploit the best training capabilities of both environments. In addition, using our in-house simulator research facilities, we investigate the role of simulation devices ranging from desktop training devices to flight simulators, and the role of instructors in the initial and advanced flight training programs. We have identified the role of simulation devices, instructors, and instructional processes in a model simulator training program for Initial Entry Rotary Wing (IERW) flight training, and are now evaluating prototype helicopter instrument flight training in the TH-67.

In FY2000 we will:

- Conduct transfer of training research on:
  - simulator based TH-67 training for the contact phase of IERW flight training, and
  - the Intelligent Flight Trainer automated verbal coaching concept for hover, approach, and landing pattern tasks.
- Evaluate a simulator-based training program for OH-58D aircraft qualification.

Dr. Dennis C. Wightman
Chief, Rotary Wing
Aviation Research Unit

Technologies to Enhance Training and Performance Across Simulation Domains

Training embedded in combat systems, simulators, and simulation environments forms the technological backbone of the Army's future training capability. Incorporation of behaviorally-based technologies, methods and models will significantly contribute to effective means for exercise control, performance measurement, feedback, operation of computer generated forces and measures of effectiveness that can be used across simulation domains.

This effort (FY1999-00) will provide the Army with:

- Methods to ensure effective training in Embedded Training (ET) environments.
- Tools to measure unit performance in digital environments.
- Models that incorporate realistic computer-generated forces in virtual and constructive simulations.
- Methods that measure effective use of simulation environments.

Embedding Training in Systems

These products will support generation of requirements by the Training and Doctrine Command (TRADOC) and system development and improvements to exercise control and feedback systems in live and virtual training domains by STRICOM. We have completed development of an intelligent tutor embedded training prototype, as well as a Human Performance Cognitive Model capable of representing and evaluating variables which degrade performance in combat.

Close Combat Tactical Trainer.

In FY2000 we will:

- Extend the model to include training and time pressure effects, so that human performance variability can be reflected more realistically.
- Identify digitally-based measures of unit proficiency that are useful for training feedback and analyses.

Dr. Stephen L. Goldberg
Chief, Simulator
Systems Research Unit

Maximizing Resource Efficiency of Reserve Component Weapons Qualification

RC soldiers and units are being asked to maintain a higher level of readiness on more tasks and to serve repeatedly in extended missions, yet still face the same constraints of training time and resources. Weapons qualification training time could be reduced with more efficient training strategies and use of simulators.

This effort (FY1999-01) will produce strategies and tools for training and evaluating rifle marksmanship as well as tank gunnery, to reduce the amount of time needed for subsequent live-fire evaluation. We have already developed an RC tank gunnery engagement strategy that reduces resources needed for assessing gunnery proficiency by 20%.

Reduce Training Time

The U.S. Army Reserve Command and the National Guard Bureau plan to use ARI's research findings to reduce the amount of time needed to assess weapons qualification at live-fire ranges, leading to RC-wide savings in training time. Successful strategies will be incorporated into FORSCOM, NGB and TRADOC documents that address RC training.

In FY2000 we will develop a tool to predict live-fire rifle marksmanship scores from simulator scores.
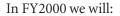
Dr. Ruth Phelps
Chief, Reserve
Component Training
Research Unit

Force XXI Training Methods and Strategies

The Army force at the beginning of the 21st century will consist of units that are digitized, units that are conventionally equipped, and units that contain a mix of digital and conventional capabilities. With this mix of capabilities, the Army faces a major requirement for the development and implementation of training methods, training support packages, and training strategies that meet future unit needs.

Preparing for Digitization

This effort (FY96-00) has designed prototype training methods and associated performance assessment instruments for Force XXI, and conducted Front End Analyses for simulation-based training of digital units. By completion of this effort, ARI will produce prototype training and performance evaluation techniques to support digital integration capabilities for Force XXI. These research findings and products will be provided to TRADOC for application in the development of future training support packages and to support the acquisition of simulators and performance assessment systems for digital unit training.

In FY2000 we will:

- Complete and document the research, focusing on the implementation and assessment of specific Force XXI Training Programs with selected Army units.
- Refine training methods as needed for meeting selected Force XXI requirements.

Dr. Barbara A. Black
Armored Forces
Research Unit

Assessment of Force XXI Training Tools and Techniques

The transition of the Army to Force XXI will require training that increasingly is simulation-based. Units will need tools and techniques for developing, assessing, and tailoring training packages to prepare for a variety of operations using mixes of equipment, real and simulated.

This effort (FY99-01) will provide the Army with prototype tools and techniques for developing, delivering, tailoring, assessing, and refining simulation-based training to meet dynamic Force XXI requirements, with a focus on the mounted force. We will provide such products as the Commanders' Integrated Training Tool (CITT) for use with the Close Combat Tactical Trainer (CCTT) as part of an integrated package of training tools and techniques for unit commanders and other unit trainers. We have already produced prototype training support packages (TSPs) for platoon and company teams (armor infantry mix) on Force XXI digital operations in the CCTT. Also, the second generation CITT has been refined for use with the CCTT.

Unit Training Development

In FY00 we will:

- Develop and refine performance assessment tools for digital unit training in the CCTT and other simulation environments.
- Assess utility of Force XXI training packages, focusing on those produced by units through CITT and other available tools.

Dr. Barbara A. Black
Chief, Armored Forces
Research Unit

Training Modernization for Infantry Forces

As the Army progresses from Force XXI to Army Vision 2010 to the Army, 2010 and Beyond, soldiers will be exposed to an unparalleled variety of new operational concepts and technologies. Training of Infantry forces is increasingly complex due to the fielding of high-tech weaponry, increasingly high levels of information, more complex battlespace, rapid situational change, threats that are difficult to define, and multiple rules of engagement influenced by a growing range of military options.

Soldiers on a MOUT exercise.

Preparing Infantry for the Modern Battlefield

This effort (FY1999-02) will provide the Army with training methods that enhance situation awareness, processing and integration of battlefield information, and other aspects of soldier and unit performance in the context of emerging high-tech Infantry systems. Research supporting the Military Operations in Urban Terrain (MOUT) Advanced Concept Technology Demonstration (ACTD) has developed a training impact analysis methodology to enhance rapid acquisition selection decisions of MOUT technologies. Research results will also guide the design of training programs related to future Infantry force systems, such as the M2A3 Bradley Fighting Vehicle, the Objective Individual Combat Weapon, and Land Warrior-like technologies. Other research will compare alternative models for measuring small unit situation awareness.

In FY2000 we will:

- Assess effectiveness of preliminary M2A3 Bradley Fighting Vehicle training programs and training devices.
- Define the sequential training impacts of all systems selected for inclusion in the MOUT ACTD technology package.
- Develop a situation awareness measurement instrument for buddy-teams through platoons.

Dr. Scott E. Graham
Chief, Infantry Forces
Research Unit

Training on Demand

Training in the Army is shifting from a classroom-based system to one that is soldier-centered. The purpose of this soldier-centered system is to deliver instruction on demand wherever and whenever needed. Research on how to use distributed delivery systems to train will help the Army take best advantage of emerging technologies.

This effort (FY1999-2002) will demonstrate that learning over the Internet using audiographics – graphics plus the instructor's voice only – is 30% less costly and just as effective as traditional classroom methods. The evaluation procedures were converted to an Internet-based method that saved 90% over the production and distribution costs of paper-based procedures.

Exploiting Distributed Delivery Systems

By its completion, ARI will provide the Army with strategies and "how to" guidelines for developing and implementing a soldier-centered, training-on-demand paradigm that uses training delivery technology from the commercial marketplace. Research will test increasing levels of training complexity to determine viability of the delivery mechanisms. The Internet will be tested as a means to provide asynchronous collaborative learning environments for tasks such as selecting target priorities in a rapidly evolving battlespace.

In FY2000, we will:
Compare the quality and effectiveness of distributed learning for cognitive skills to traditional instruction in the schoolhouse using advanced artillery tasks as the exemplar context.

Dr. Franklin L. Moses
Chief, Advanced
Training Methods
Research Unit

Principles and Strategies for Training Digital Skills

The Army is greatly increasing its use of weapons, equipment, and technologies that depend on soldiers and commanders with information-age, digital skills. Determining how best to train and sustain these required skills is essential for high proficiency in digitized operations and procedures.

This effort (FY1999-2003) has produced a comprehensive plan of training research needed to help the Army maximize the benefits of "going digital." The plan addresses critical research about training soldiers and commanders to: (1) seek out, identify, and utilize information, (2) cope with extensive quantities of data and information, (3) operate as components in interconnected digital networks, and (4) make better informed individual or collective decisions.

Mastering Computer-Based Jobs

Based on the plan, specific research will test principles and strategies for individual soldiers to maximize the acquisition, transfer, generalization, and retention of non-system specific digital skills. By completion of the research, ARI will provide the Army with training principles and prototype-training methods for achieving high proficiency in digitized operations and procedures.

In FY2000, we will:

- Calibrate a Skill Retention Model to predict when tasks involving digital operations and procedures will need retraining.
- Compare alternative ways to train soldiers to manage large amounts of information such as messages and intelligence products.

Dr. Franklin L. Moses
Chief, Advanced
Training Methods
Research Unit

Developing Commanders for the Future Battlefield

Traditional officer development has focused on the acquisition of knowledge. To face future challenges and solve military problems effectively, Army leaders will need to improve their versatile thinking skills, critical reasoning, creativity, and adaptability to change.

In this effort (FY98-02), we have developed a model of *versatile* thinking skills for future battle command, and validated measures of leaders' *tacit knowledge* (critical knowledge gathered through experience). Also, we have documented staff officers' cognitive skills training and development requirements. By its conclusion, ARI will have provided the Army with self-paced instruction in complex thinking skills that supplements and extends standard command and staff development programs. The instruction will reflect changes in missions, tasks, tools, and organizational structures projected for Force XXI and Army, 2010 and Beyond. This supplemental training will be provided for inclusion with officer development activities at the U.S. Military Academy, Cadet Command, and the Command and General Staff College.

Versatile Thinking Skills

In FY2000 we will:

- Develop a model for describing the relationship between critical thinking skills, knowledge, attitudes, battle command tasks, and battle command performance.
- Develop, demonstrate and evaluate instructional modules for versatile thinking in command (focusing on brigade staff functions and tasks).
- Develop methods to measure effectiveness of versatile thinking skills training.

Dr. Stanley Halpin
Chief, Fort
Leavenworth Research
Unit

Leadership in a Changing Army

Leading Change

Leader development is among the highest priorities of the DCSPER of the Army and the Chief of Staff as the Army faces planned and unplanned changes in coming years. Changes in Army Doctrine, Organization, Training, Leadership, Materiel, and Soldiers (DOTLMS) will produce new cognitive requirements and emotional demands for leaders and for those they lead. The critical task for all Army leaders will be to implement structural, procedural, and technical changes in a way that maximizes human performance, commitment, and trust in the Army of the future.

In FY1999, the DCSPER supported the development of a focused research plan and agenda to identify new leadership models, technologies, and "best practices" that foster effective performance amid changes in DOTLMS. As part of the development of the agenda, we produced a leadership assessment tool kit of useful measures of leader performance and processes - a "cookbook," if you will, of methods that can be used by the Army to assess leadership effectiveness for both practical and research purposes.

In FY2000 we will implement an effective and practical research program to produce the leadership techniques and job aids needed for a changing Army and the Army of the future.

Dr. Paul Gade
Chief, Organization &
Personnel Resources
Research Unit

Assessing Stabilization of Command

With Army downsizing, branch-qualifying opportunities for Majors have diminished as a result of rapid turnover, frequently producing negative effects on unit readiness, cohesion, and morale. The Chief of Staff of the Army directed that we examine stabilization of the timing and length of battalion staff assignments as a way of counteracting these effects.

In this effort (FY98-00) ARI will provide the Army with an assessment of the attitudinal and behavioral effects and other impacts of stabilizing the tours of battalion commanders and their critical staff members for an overlapping 24-month period. We have completed all data collections. The Army will use the results to develop assignment/utilization policies that enhance unit readiness, emphasize unit cohesion, and foster the career development of leaders.

In FY2000 we will complete the assessment of stabilized-battalion/non-stabilized-battalion differences in commitment, cohesion, unit climate, performance, and communication with higher and lower echelons of command.

Stabilizing Battalion Staff Tours

Dr. Paul Gade
Chief, Organization &
Personnel Resources
Research Unit

21st Century NCO Requirements

The battlefield of the future and Army 2010 and beyond will require Noncommissioned Officers (NCOs) who can train forces and operate effectively in digital environments with increased mission diversity, fewer soldiers, and organizational and social changes. The NCO promotion system for the 21st century will need new NCO selection and measurement procedures to evaluate the full scope of performance needed to successfully meet future job requirements.

Performance-Based Promotion

This effort (FY98-02) has identified future NCO job demands and future NCO personal characteristics for Army 2010 and beyond. By its conclusion we will provide the Army with:

- Better predictors of future NCO performance.
- A basis for linking NCO promotion decisions to measures of performance and potential.

The Army's Deputy Chief of Staff for Personnel, U.S. Total Army Personnel Command, Sergeant Major of the Army, U.S. Army Sergeants Major Academy, and U.S. Army Training and Doctrine Command will use these products as a basis for developing improved NCO promotion procedures, and to guide future NCO training and development.

In FY2000, we will:

- Develop prototype Army 2010 and Beyond NCO performance measures.
- Develop prototype new NCO attribute measures.

Dr. Michael Rumsey
Chief, Selection and
Assignment Research
Unit

Improving Personnel Development for Small Unit Operations

Doctrine and mission requirements of Force XXI and Army, 2010 and Beyond will emphasize small, highly trained semi-autonomous units. A model for this is today's Special Forces (SF). The SF recruiting, selection, and training systems must ensure adequate soldier flow to these high performing, highly demanded units. Developing methods and strategies that facilitate this process, and transferring these to other Army units will improve our capability to develop forces for diverse and rapidly changing missions.

Special Forces as a Testbed

This effort (FY97-01) has identified specific individual, team, and organizational practices that inhibit or facilitate effective SF team performance and morale. We have analyzed the current structure of the soldier development process in the SF assessment and training pipeline, and have identified changes that are essential in meeting changing mission requirements and force needs. Several of the interventions developed in this program, including integrity measures, peer evaluations, and adaptability assessments, have critical applications to conventional Army units.

By FY2001 we will provide the Army with:

- New assessment tools and techniques implemented in the conventional Army that provide information about critical areas such as soldier integrity, adaptability and interpersonal skills.
- Methods and strategies for SF leaders to use to diagnose problems, design solutions, and implement and evaluate individual, team, and organizational level interventions.

In FY2000, we will:

- Develop methods that can enhance the assessment and development process of Special Forces soldiers.
- Design and improve assessment and development tools for soldier integrity, adaptability, and interpersonal skills that can be transferred to the conventional Army.

Dr. Paul Gade
Chief, Organization &
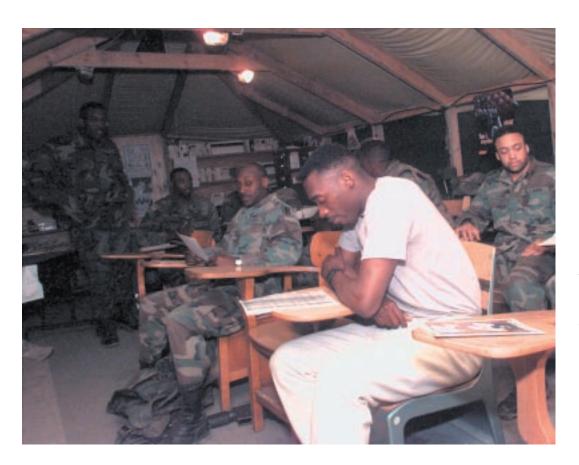Personnel Resources
Research Unit

Soldier Attitudes and Opinions

Senior leaders have a continuing need to accurately assess the command climate of the Army and to identify the issues that concern soldiers. This research on soldier attitudes and opinions provides input for Army policies and for program decision-making.

This FY98-03 effort has developed a methodology for assessing soldier attitudes and opinions and conducting assessments of command climate. ARI will continue to provide data on soldier attitudes and opinions and develop improved methods for assessing them. This will allow the DCSPER, HQDA and other senior leaders to gain insight into soldier concerns, track trends, identify emerging issues, and provide solutions to Army problems.

In FY2000 we will:

- Refine methods to assess the Army command climate.
- Identify recurring and new issues of concern to soldiers.

Command Climate

Dr. Alma Steinberg
Chief, Army Trends
Analysis Group

Attrition Determinants and Management

Lately, over one-third of the soldiers attrit the Army before having completed the first term of enlistment. High attrition rates impose burdens on recruitment, increase training costs, and reduce the personnel stability needed for unit preparedness. The Army needs a solid understanding of the causes of attrition and of ways of reducing it.

First-Term Attrition

This effort (FY2000-03) will add to existing data on attrition during initial entry training to determine the personnel, organizational, and extra-organizational factors that account for attrition across the first enlistment term. By project conclusion, these data will be used to construct a model of first-term enlisted attrition. Strategies for effectively managing attrition during key phases in the enlistment period will be identified and assessed. The Office of the Assistant Secretary of the Army (Manpower and Reserve Affairs) and the Army's Deputy Chief of Staff for Personnel will use these products for initiatives to reduce attrition and build the career force.

In FY2000, this project will:

- Identify the personal and career history variables, contained in Army administrative files (e.g., Operational Recruiter Master File, Enlisted Master File), that best account for the first-term attrition of Year Group 92 enlistees.

- Determine the factors that influence graduates from Initial Entry Training to continue service and complete their obligation.

Dr. Michael Rumsey
Chief, Selection and
Assignment Research
Unit

Study and Analysis Program

*The objective of ARI's Study and Analysis Program is the use of behavioral and social science expertise and data to perform short-term efforts – many of only a few months' duration – that directly enable decisions to resolve **T**raining, **L**eader Development, and **S**oldier issues .*

Training Concepts for Virtual Environments

Virtual environment technology has been successfully applied to the training of individual, crew and collective tasks. For the most part, the decision to employ virtual environment technology to meet a particular training need has been haphazard. Only after a device is fielded has a determination been made about what tasks it is capable of simulating and training. Given the cost of development and alternatives for implementation (stand alone vs. embedded trainers), policies are needed that specify methods for forecasting the tasks that can be represented and trained by current and anticipated future simulation technologies.

Meeting Training Needs with Virtual Simulations

This study will examine methods that have been developed for deriving training system requirements or determining their capabilities. These methods will be reformulated and integrated to allow TRADOC requirements generators to evaluate the task coverage and applicability of a virtual training solution to a particular training need. This analysis will also provide data on how the virtual simulation solution would be used in conjunction with live and constructive environments. The product of this study will be an approach for evaluating the capabilities of virtual simulation to represent the tasks and missions within a given military application domain.

Sponsor: TRADOC, National Simulation Center

Dr. Stephen Goldberg
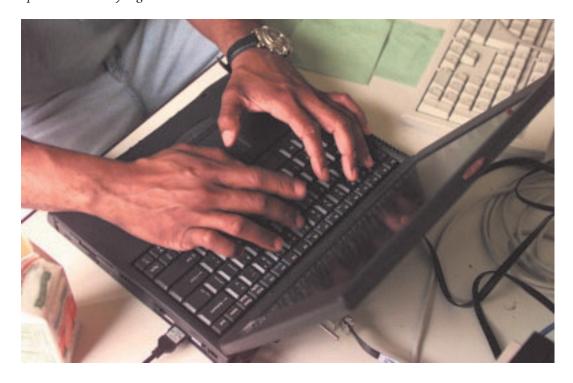Chief, Simulator
Systems Research Unit

Automation and Information Technology Required for Army Jobs

The Army can increase the efficiency and effectiveness of soldiers, teams, and commands by standardizing and consolidating the training associated with automation and information technology. There is a need for a procedure to map soldiers' required knowledge, skills, and other attributes (KSAs) across a spectrum of Career Management Fields (CMF) and branches.

In this study, ARI will lay a foundation to help manage information technology training. Data such as 'relative importance to the job,' 'depth of knowledge required,' and 'level of mastery' will be collected for these KSAs on samples representative by MOS and skill level. An information technology KSA database will be prepared. Analysis of the data will provide the training schools with guidance to enable course modifications and clustering of MOS for information technology training efficiency. CMF 13 (Field Artillery), CMF 31 (Signal Operations), and CMF 74 (Record Information Operations) will be studied for this initial application. The Field Artillery CMF contains jobs such as Cannon Crewmember and Cannon Fire Direction Specialist with very diverse information technology requirements. The other two CMFs function in a wide range of systems, and will provide a strong test of the robustness of the developed procedure.

Defining Knowledge, Skills and Attributes Required for Information Technology Jobs

Sponsor: US Army Signal Center and Ft. Gordon

Mr. Darrell Worstine
Chief, Occupational
Analysis Office

Commanders' Insights and Assessments on Managing Change in Digital Divisions

The Army has selected the 4th Infantry Division to become the First Digital Division (FDD). Commanders in the division and their respective staffs contribute to the success of this digital fielding process through their innovative ability to "manage change." The commander and soldiers of the FDD are involved daily in managing and coping with change. There is a need to capture their organizational knowledge and personal insights, for these are key to the success of subsequent digital divisions as well as to the success of their individual position replacements.

Knowledge Sharing for Managing Change

ARI will determine the focal areas of concern that best describe the commander and key leader interactions and insights. We will design a relational database and elicit the commander and key leader insights in these focal areas. We will then codify that knowledge in an easily accessible and modifiable database. This study will support commanders with tools and techniques for continual updating of the database toward the goal of fostering a learning organization in this and future digital divisions.

Sponsor: USAARMC Directorate of Training and Doctrine Development, Commanding General, 4th Infantry Division

Dr. Barbara A. Black
Chief, Armored Forces
Research Unit

Effectiveness of Distance Learning for Battle Staff NCO Course

The Sergeants Major Academy (USASMA) has initiated a shift in instruction from traditional classroom to a distance learning (DL) format. Commanders and other unit leaders have long been satisfied with the quality of graduates from the traditional course. On the surface , students also meet objectives in an initial use of DL for the Battle Staff NCO course. However, USASMA has lingering questions, as do other activities implementing DL, about how adequate this form of instruction is in terms of on-the-job performance.

Evaluating Distance Learning

In this study, ARI will track the job performance of graduates from the DL course for Battle Staff NCOs and compare that to the job performance of graduates from the traditional classroom. Job performance will be measured through ratings of key tasks by immediate supervisors. Ratings will be collected between 6 and 12 months after completion of the traditional or DL version of the course. In addition, an assessment of student satisfaction and motivation will be performed close to the completion of that training. Analyses of data will address questions concerning:

1. how well do DL students perform key tasks on the job compared to students trained in the traditional classroom manner, and

2. what is the level of student satisfaction/motivation relating to the DL training compared to traditional classroom training. Lessons learned will provide the basis for TRADOC to evaluate other DL implementations.

Sponsors: US Army Sergeants Major Academy and TRADOC DCS(T)

Dr. Franklin L. Moses
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Recruiting Support Multipliers

Recruiting Support Battalion (RSB) mobile exhibits, the Golden Knights (GK) parachute team, and the Army Marksmanship Unit (AMU) are centrally managed resources employed by Army Recruiting Command (USAREC) to generate public interest in the Army and to support recruiting efforts. Together these programs can be viewed as forms of regional/local advertising. In this time of tight budgets, Army management seeks to examine the effectiveness of these programs.

Effectiveness of Recruiting Efforts

There are a variety of potential outputs or benefits of these programs. There are tangible outputs, such as recruiting leads, which can be identified albeit with some approximation, and there are more difficult to measure effects (e.g. increased recruiting activity), including intangible ones (increased community appreciation). On the other hand, cost data are apparently available. The planned analysis will compare average cost per lead through the RSB program with the costs of other similar-in-purpose activities, embedded within a larger discussion of program benefits and operations. With regard to the GK and AMU programs, the measurement of benefits is an even more challenging task. For these, a first step would be to fully describe the benefits, and develop allocation methods that will allow comparison of the recruiting-support part of these program costs with other (e.g., advertising) activities.

Sponsor: USAREC

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Implementation and Field Test of Enlisted Personnel Allocation System

Benefits of improved soldier performance and human resource utilization would be realized from optimization in the classification process – the matching of recruits to initial training and job assignments. The Enlisted Personnel Allocation System (EPAS) is designed to enhance REQUEST, the Army's current training reservation system, allowing REQUEST to offer more optimal training opportunities and assignments to incoming recruits.

The production version of the EPAS module is scheduled for completion by January 2000, to be followed by field testing of EPAS-enhanced REQUEST which is expected to last about twelve months. The field test will be undertaken to address procedural and efficacy questions that cannot be examined through simulation testing. The entire effort will link individual characteristics, abilities and preferences with Army requirements and policies to optimize soldier assignments, extending REQUEST's training reservation capability to ensure that the Army takes maximum advantage of each individual's potential in making job assignments.

Sponsor: DAPE-MPA

Optimizing Job Assignment

Dr. Michael Rumsey
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Training-Base Attrition Study

The DCSPER, as agent for the Chief of Staff of the Army (CSA), tasked ARI to conduct an in-depth study to determine why soldiers attrit service from the entry training base. Reflecting the CSA's focus, the DCSPER directed a survey of exiting trainees during 1999.

Trainee Attrition

ARI responded by augmenting an ongoing project , sponsored by the Assistant Secretary of the Army for Manpower and Reserve Affairs ASA(M&RA), to intensify the focus on reasons for attrition from the training base. Soldiers entering service from Jan-Aug 1999 respond to questionnaires when they first arrive at reception units. These same soldiers later respond to questionnaires at the completion of entry training phases. The reception and end-of-training questionnaires will produce self-reports of enlistment reasons, service expectations, and personal commitment to carrying out enlistment obligations. Soldiers separated from the Army while in the training base will complete another questionnaire as part of Army out-processing to report their reasons for separation. The separation folders of attriting soldiers will also be analyzed. These data will enable comparison of self-reported reasons for separation against the official reasons recorded in the folders. Evaluation of soldier quality will make use of performance assessments received by retained and separated soldiers during entry training.

Sponsor: DCSPER

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Assessing the Impact of the Army Continuing Education System

The Army Continuing Education System's (ACES) mission is to promote lifelong learning opportunities to improve the capabilities of soldiers by providing and managing quality self-development programs and services. An assessment is needed to determine the impact of the ACES program on personnel retention, job proficiency, and career progression.

The study will be conducted in two phases. In Phase 1, military compensation and personnel retention studies completed over the last five years will be reviewed. Concurrent with this review, existing databases will be examined for information availability and suitability. A model for evaluating the relationship of in-service civilian education to indicators of career progression and job proficiency will be constructed. Phase 2 will implement portions of the evaluation model. Study findings will provide a basis to make decisions for improving enlisted recruiting and retention, and provide quantifiable, defensible formulations on the use of education in support of training.

Relationship to Personnel Retention and Job Performance

Sponsor: PERSCOM-PDE

Dr. Michael Rumsey
Chief, Selection and Assignment Research
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Updating ARI Educational Benefits Usage Data Base

The provision of post service educational benefits is an important and expensive program designed to bolster recruiting and to address larger social goals. Accordingly, program participation and benefit usage must be monitored by Army planners responsible for managing and assessing the programs, projecting future financial obligations, and reporting to Congress.

The ARI educational benefits usage database tracks Army College Fund and Montgomery GI Bill program participation and benefits usage for each accession cohort going back to 1981. The update process in this study pulls data from Army personnel records, the Defense Manpower Data Center, and the Department of Veterans Affairs. Quaterly reports are provided to Army planners.

Tracking GI Bill and Army College Fund Usage

Sponsor: DAPE-MRA

Dr. Michael Rumsey
Chief, Selection and
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Basic Research

Identifying New and Promising Technologies

The Research and Advanced Concepts Office (RACO) manages our Basic Research Program, which focuses on personnel, leadership, and training issues of the future. RACO maintains close contacts with ARI's applied researchers and other relevant agencies within the Army. These contacts provide two advantages. First, they help to better define issues that require fundamental research, and second, they facilitate the transition of basic research results to the applied program for eventual use by the operational Army.

Research is continuing to seek a better understanding of those factors that contribute to faster learning and more durable retention of skills. An initial model, procedural reinstatement theory, has been developed that is the basis for further investigation of the development of information handling skills. Research has been initiated to evaluate the use of latent semantic analysis to assess an individual's knowledge structure and to aid in the automatic analysis of free-range text descriptions.

Training Research

The focus of the program is a better understanding of those behaviors that contribute to effective leadership. Recent efforts determined the role of group goals and task strategies on group performance. Efforts continue to determine how transformational styles contribute to successful leadership and understanding how tacit leadership knowledge is developed. A goal of the program is to develop a conceptual model of leader-team performance. New research is beginning to determine the effects of electronic communication on the development of trust between leaders and subordinates and performance effectiveness.

Leadership Research

Efforts in this area are designed to better understand the relationships between American society and the Army. As both American society evolves and as the Army changes its structure, missions and training, the changes have the potential to affect soldier and unit performance. We have recently completed research studying African-American propensity to enlist. Research is now being performed to better understand the role of Army culture on cohesion and morale.

Societal Research

Dr. Michael Drillings
Chief, Research and Advanced Concepts Office

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Occupational Analysis
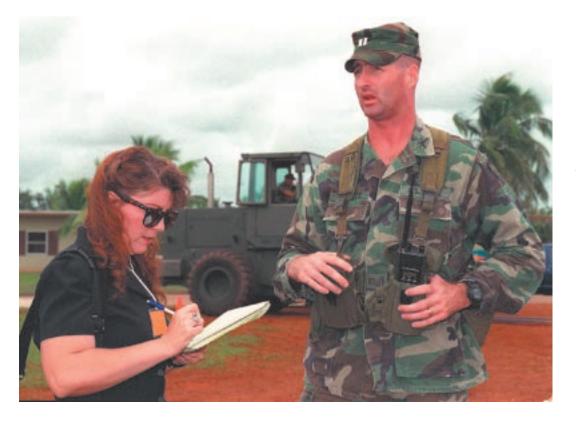
Occupational Analysis Program

The Occupational Analysis Office (OAO) analyzes, synthesizes, and reports data on the job requirements of officer and enlisted occupations in both the Active and Reserve Components. Occupational analyses are generally performed when weapon systems, organizational structures, or task performance requirements change. These analyses focus on the need for MOS design/redesign, including creation of new MOS and the consolidation of existing MOS. In addition, the task performance, skill, and knowledge requirements of MOS are examined to determine training requirements that best support the occupational structure. OAO typically analyzes 16-20 MOS' per year, and the FY2000 workload will be substantially the same. OAO projects currently underway include job requirements studies of Infantry Officers, Battle Staff NCOs, First Sergeants and Air Traffic Controllers.
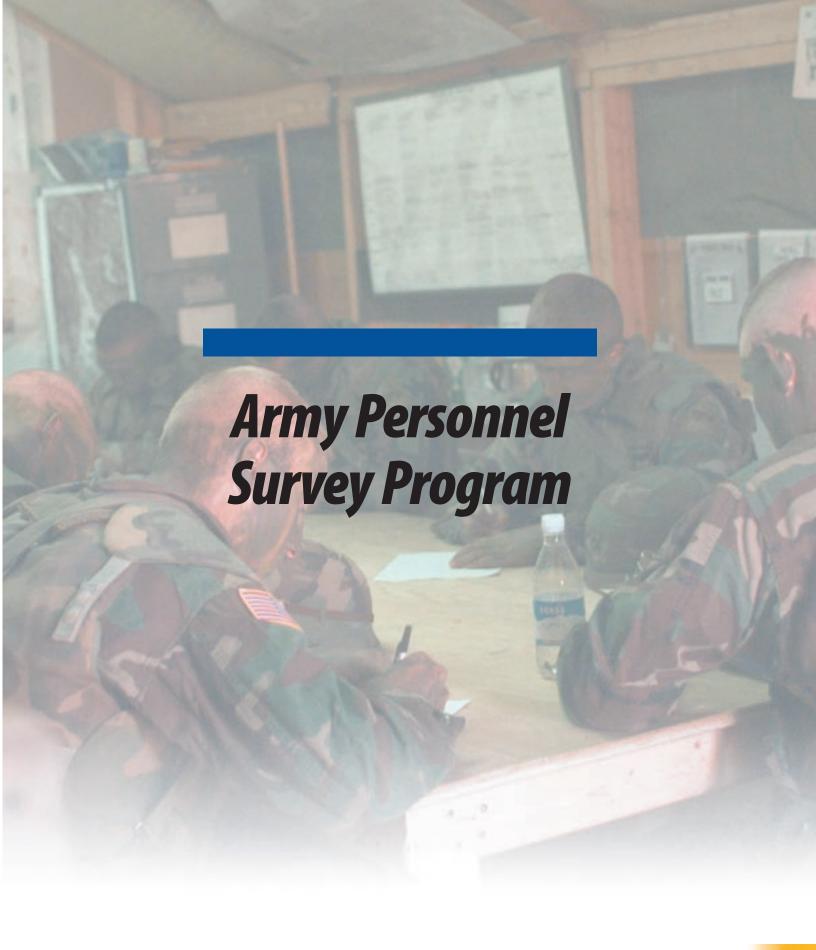
Current

To enhance the Army's Occupational Analysis capacity OAO is pursuing the following modernization efforts:

Modernization

- Expanding OA technology to the schools to include establishing a distance learning capability.
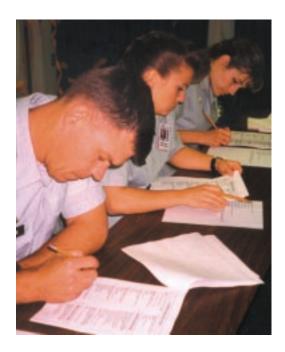- Using the Internet for data collection.

Mr. Darrell Worstine
Chief, Occupational
Analysis Office

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Army Personnel Survey Program

Army Personnel Survey Program

The Army Personnel Survey Office (APSO) is the Army's Center of Excellence for attitude and opinion surveys of Active Component soldiers and their dependent family members. Top Army leaders use the survey data to "keep a finger on the pulse" of the Army. The survey findings keep Army leaders informed about the needs of Army personnel, the need for special policies and programs, and the impact and outcomes of the policies and programs implemented. For example, Army trend data on soldiers' satisfaction with retirement benefits provided DoD officials with the best information for Congress on declining satisfaction with retirement benefits.
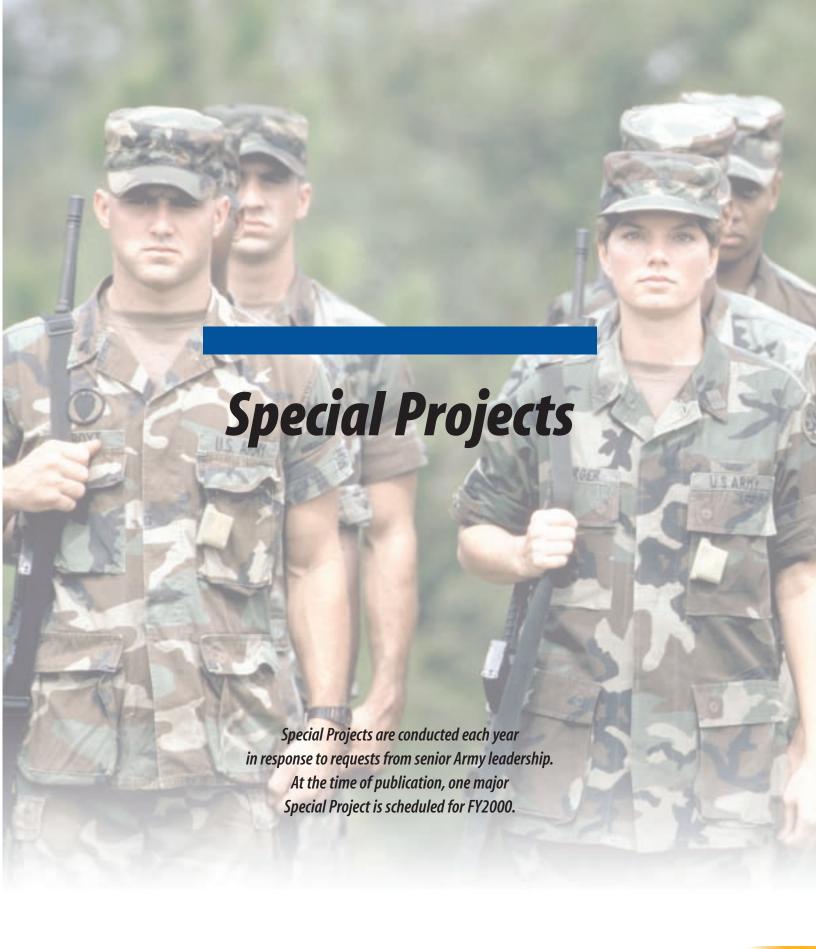
Attitude and opinion surveys provide unique information because survey data have the following unique combination of characteristics: quantifiable, valid, reliable, objective, comparable, relational, replicable, generalizable, inclusive, capable of indicating trends, and anonymous. In short, surveys provide the Army with a highly cost efficient means of measuring what soldiers and their dependent family members think and do.

APSO conducts two Army-wide surveys on a recurring basis: the omnibus, semi-annual *Sample Survey of Military Personnel (SSMP)* and the biennial *Survey on Officer Careers (SOC)*. Army agencies and activities identify specific topics to be included in these surveys, and the results are reported directly to these proponent organizations. In addition, trend data are collected for the Army by including on a regular basis questions on topics such as satisfaction with the quality of life in the Army, job satisfaction, attitudes toward downsizing, and perceptions of morale.

Dr. Morris Peterson
Chief, Army Personnel
Survey Office

The APSO FY2000 program includes the *Spring* and *Fall SSMPs*, *SOC 2000* and three to five personnel surveys requested and paid for by other Army organizations. In addition, APSO will continue to provide technical advice and assistance related to surveys of Army personnel, prepare special analyses and reports to respond to requests from top Army leaders, and maintain linkages with DoD, the other Services, and the survey industry.

Special Projects

Special Projects are conducted each year
in response to requests from senior Army leadership.
At the time of publication, one major
Special Project is scheduled for FY2000.

Human Relations Update 2000

The Secretary of the Army with concurrence from the Chief of Staff has directed ARI to conduct an Army-wide assessment of human relations, identify issues the Army can benefit from tracking, and develop a long-term method to track these important issues.

This project will use a multi-method approach (surveys, focus group interviews, and individual interviews) to accomplish three primary goals: (1) to take a snapshot of the current human relations environment – what's going well, what's not; (2) to evaluate the various programs fielded by the Army over the last two years to improve the human relations climate; and (3) to develop a method to track important human relations issues so Army leaders at all levels can stay in touch with soldier and leader perspectives in their everyday working environment.

Assessing the Army Human Relations Environment

Data will be collected early in FY2000 from a representative sample of units from 16 Army installations world-wide. Approximately 17,000 surveys, 300 focus group interviews, and 150 individual interviews will provide the basis for the assessment, with final results expected by the end of FY2000. A procedure will then be developed to easily track important issues identified through the assessment. This will provide a continuing mechanism for Army senior leaders to stay in touch with soldiers and to establish a healthy working environment that promotes respect, fairness, teamwork, and opportunities to excel – key elements for a trained and ready Army.

Dr. Beverly C. Harris
Chief Scientist

List of Acronyms

AAN	Army After Next	MACOM	Major Command
AAR	After Action Review	MILT	Military Language Tutor
ACES	Army Continuing Education System	MOS	Military Occupational Specialty
ACTD	Advanced Concept Technology Demonstration	MOUT	Military Operations in Urban Terrain
AIM	Assessment of Individual Motivation	NCO	Noncommissioned Officers
APSO	Army Personnel Survey Office	OAO	Occupational Analysis Office
ARI	U.S. Army Research Institute	OC	Observer/Controller
ARNG	Army National Guard	ODCSPER	Office of the Deputy Chief of Staff for Personnel
ASA	Assistant Secretary of the Army	ODCST	Office of the Deputy Chief of Staff for Training
ATSC	Army Training Support Center	OER	Officer Evaluation Report
CAL	Center for Army Leadership	OPFOR	Opposition Forces
CCTT	Close Combat Tactical Trainer	OPMS	Officer Personnel Management Systems
CITT	Commanders' Integrated Training Tool	PERSCOM	U.S. Total Army Personnel Command
COBRAS	Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation	PERSTEMPO	Personnel Tempo
CONUS	Continental United States	RACO	Research and Advanced Concepts Office
CSA	Chief of Staff, Army	RC	Reserve Component
CSR	Continuous Speech Recognition	S&T	Science and Technology
CTC	Combat Training Center	SF	Special Forces
DBBL	Dismounted Battlespace Battle Lab	SOC	Survey on Officer Careers
DCSPER	Deputy Chief of Staff for Personnel	SOFLO	Special Operations Forces Language Office
DCST-ITD	Deputy Chief of Staff for Training – Individual Training Directorate	SpProj	Special Projects
DLI	Defense Language Institute	SSMP	Sample Survey of Military Personnel
DMPM	Director of Military Personnel Management	STRICOM	U.S. Army Simulation, Training and Instrumentation Command
DoD	Department of Defense	TAAF	Training Analysis and Feedback
DOTLMS	Doctrine, Organization, Training, Leadership, Materiel, and Soldiers	TDAD	Training Development and Analysis Directorate
EPAS	Enlisted Personnel Allocation System	TRADOC	Training and Doctrine Command
ET	Embedded Training	USAICS	U.S. Army Infantry Center and School
FORSCOM	Forces Command	USAR	U.S. Army Reserve
HQDA	Headquarters, Department of the Army	USARC	U.S. Army Reserve Command
IERW	Initial Entry Rotary Wing	USAREUR	U.S. Army, Europe
LFF	Live Fire Futures	USMA	U.S. Military Academy
LW	Land Warrior	VE	Virtual Environment
M&RA	Manpower and Reserve Affairs		

Selected Key Words

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